USER MANUAL

SYSTEM 10

4 X CHANGEOVER RELAY SPDT RF RELAY MODULE (MODEL No. 10-710A)

ISO 9002
Reg No. FM38792

www.pickeringtest.com

pickering

Pickering Interfaces Ltd.
Stephenson Road
Clacton-on-Sea
CO15 4NL
United Kingdom

Tel: +44 (0)1255-428141
Fax: +44 (0)1255-475058
E-Mail: sales@pickeringswitch.com

Pickering Interfaces Inc.
966 SW 6th Street
Grants Pass
Oregon 97526
USA

Tel: 541 471 0700
Fax: 541 471 8828
E-Mail: ussales@pickeringswitch.com

Pickering Interfaces GmbH
Buchenstrasse 15
D-77880
Sasbach
Germany

Tel: +49 7841 66 49 10
Fax: +49 7841 66 49 12
E-Mail: desales@pickeringswitch.com

Pickering Interfaces AB
Karl Nordströmsväg 31
432 53
Varberg
Sweden

Tel: +46 340-69 06 69
Fax: +46 340-69 06 68
E-Mail: ndsales@pickeringswitch.com

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Worldwide Technical Support and Product Information

http://www.pickeringtest.com

Pickering Interfaces Headquarters

Stephenson Road Clacton-on-Sea CO15 4NL United Kingdom
Tel: +44 (0)1255-428141
Fax: +44 (0)1255-475058
E-Mail: sales@pickeringswitch.com

Worldwide Offices

Germany	Tel: +49 7841 66 49 10	Fax: +49 7841 66 49 12	E-Mail: desales@pickeringswitch.com
Sweden	Tel: +46 340-69 06 69	Fax: +46 340-69 06 68	E-Mail: ndsales@pickeringswitch.com
USA	Tel: (541) 471 0700	Fax: (541) 471 8828	E-Mail: ussales@pickeringswitch.com

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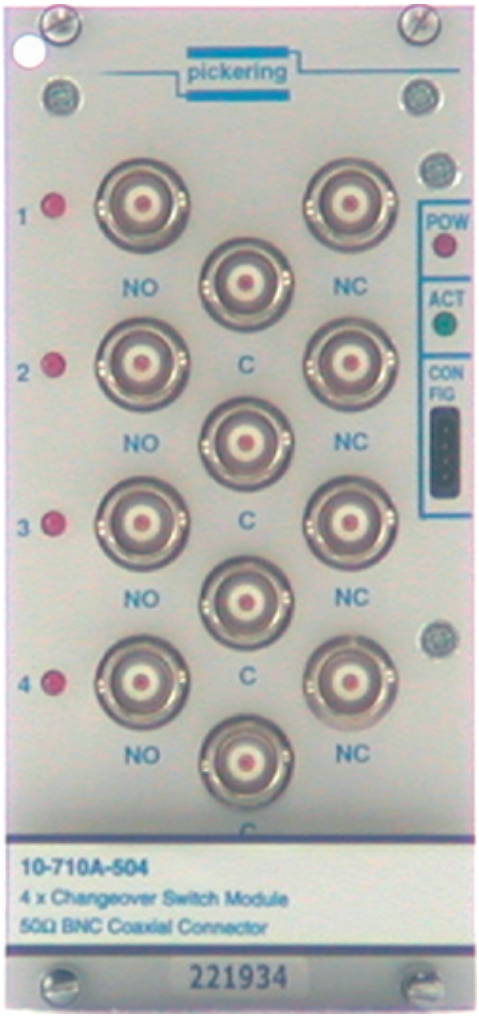
SECTION 1 - INTRODUCTION

GENERAL

The 10-710A Power Matrix Module forms part of the System 10 Programmable Switching system and uses a standard IEEE-488.2/RS-232 message based interface. The module comprise a bank of 4 individual high performance R.F. changeover switches (50 or 75Ohm, Bi directional) with very low insertion loss, suitable for handling signals up to 3000MHz. The module is provided in the following configurations:

- 4 x Changeover Relay (SPDT) R.F. Relays BNC Version, 50Ohm 10-710A-504
- 4 x Changeover Relay (SPDT) R.F. Relays SMB Version, 50Ohm 10-710A-514
- 4 x Changeover Relay (SPDT) R.F. Relays SMA Version, 50Ohm 10-710A-524
- 4 x Changeover Relay (SPDT) R.F. Relays BNC Version, 75Ohm 10-710A-704
- 4 x Changeover Relay (SPDT) R.F. Relays SMZ/Type 43 Version, 75Ohm 10-710A-714
- 4 x Changeover Relay (SPDT) R.F. Relays 1.0/2.3 Version, 75Ohm 10-710A-744



Front Panel

The module front panel LEDs are as follows:

Power LED - Connected to power system supply.

Active LED.- On whenever one or more matrix switches are closed.

Four red LEDs (one for each relay) indicate when the relay has changed over

Serial (RS-232) Configuration/Test Port

The 20-947-001 module is provided with a built-in RS-232 port (9600 baud software handshake) which is used for error diagnosis and configuration.

Self-Test

Self-Test is performed at power up and at any other time either manually or under program control. Faults are indicated by front panel mounted LEDs.

Applications

Applications include aerial switching, routing high frequency signals into oscilloscopes and analysers. The 75Ohm versions are suitable for high frequency video and telecommunication signals up to 3GHz (e.g. 622MBit data).

MECHANICAL DESCRIPTION

The 10-710A module conforms to the 3U height Eurocard standard and comprises a PCB housed in a 160mm deep screened plug-in module. Panel width is 60.96mm. The module comprises:

- SIMM Control Daughtercard
- Four RF Changeover relays mounted on a Relay daughtercard
- One motherboard mounted 64-way DIN 4162 connector
- Twelve Front Panel mounted connectors BNC, SMB, SMA, SMZ/Type 43 or 1.0/2.3
- Four Front Panel mounted red relay status LEDs
- One Front Panel mounted red POWER LED mounted on a Status PCB
- One Front Panel mounted green ACT(active) LED mounted on a Status PCB
- One Front Panel mounted RS232 connector

FUNCTIONAL DESCRIPTION

The 10-710A 4 x Changeover Relay Module (Figure 1.2), is powered by +5V and +12V supplies from the variable input power supply.

The module comprises a Mothercard which provides mounting for a plug-in Microprocessor Control SIM daughtercard (Slot 1) and a plug-in Relay daughtercard (Slot 2).

The module interface to the device under test is via four sets of front panel mounted coaxial connectors. Each set comprises Normally Open, Normally Closed and Common connectors for each of the four changeover relays.

The Microprocessor Control SIM daughtercard accepts control signals from the backplane connector J1. These signals are processed by microprocessor U1 and distributed to the 4 x Changeover Relay daughtercard (Figure 1.2) which is connected at Slot 2. The control signals are passed via a bus to Relay Driver U2 which in turn provides drive signals for the relays.

Driver U1 mounted on the mothercard provides drive for the four front panel mounted LEDs. These LEDs illuminate when the associated relays change from Normally Closed to Normally Open.

The Module also has a built in RS-232 port (9600 baud, XON/XOFF, 8 bit, no parity). This is provided on a 4 pin Molex datamate connector on the front panel. A separate adapter lead to allow use with a standard 9 pin D-type is available. The RS-232 port allows the module to be configured, controlled and monitored from any RS-232 terminal.

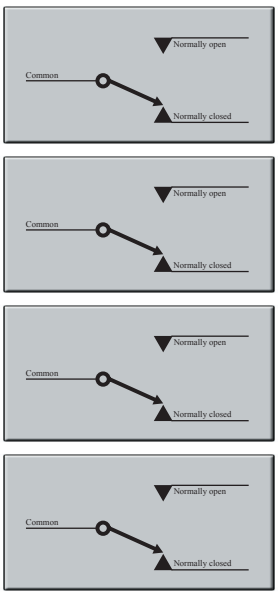


Figure 1.1 - Relay Schematic

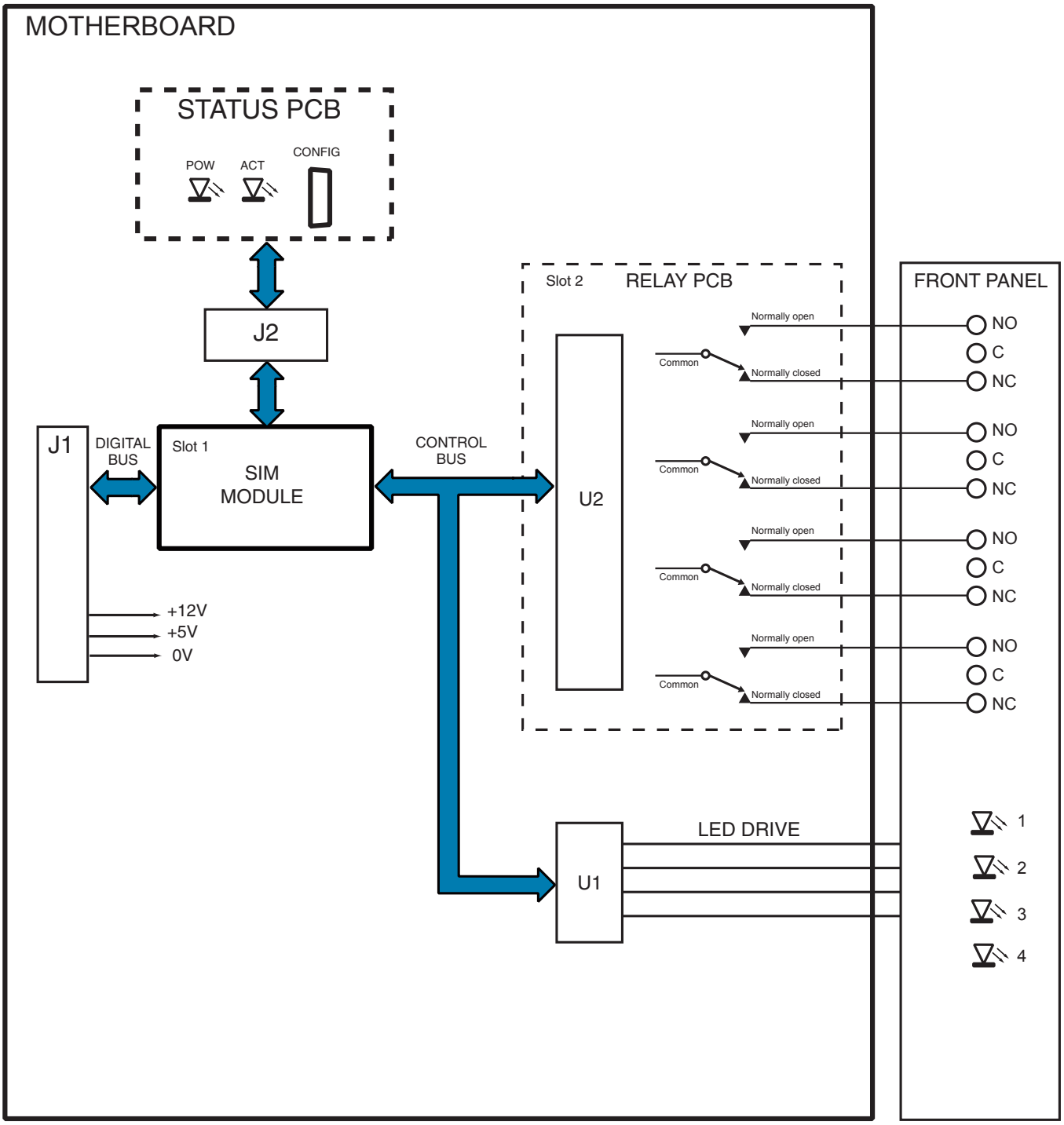


Figure 1.2 - 4 x Changeover Relay Module (10-710A): Functional Block Diagram

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SECTION 2 - PIN OUTS

The following pages provide pin outs for the 4 x Changeover Relay Module 10-710A.

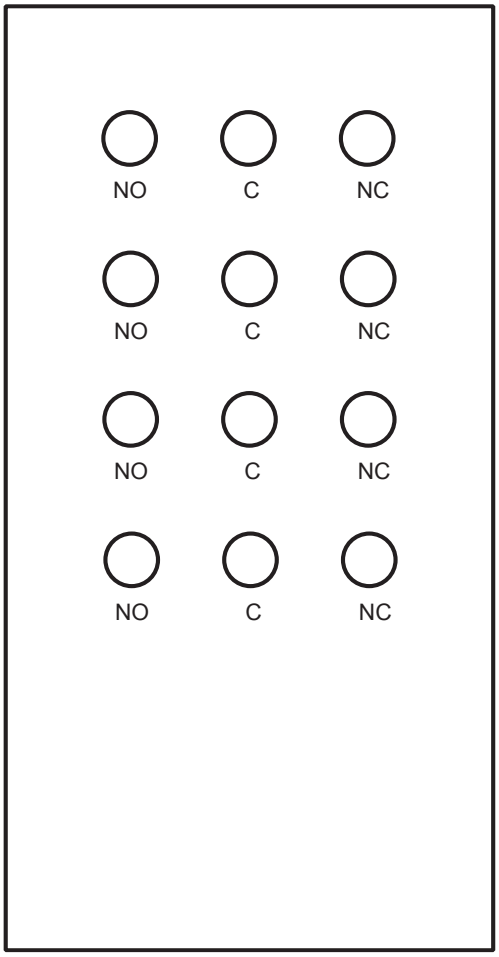
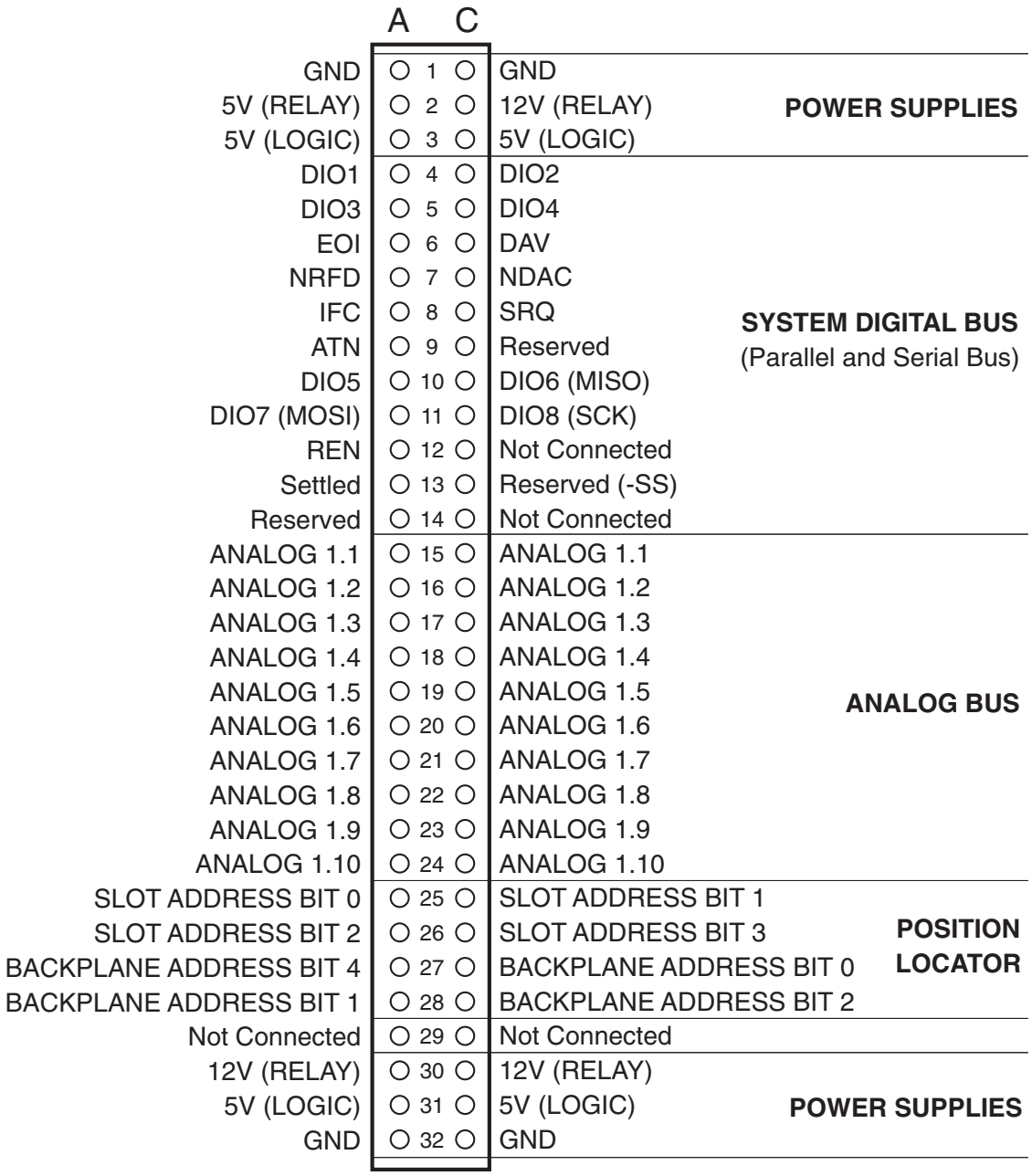


Figure 2.1 - Front Panel: Pin Outs


A C
GND 1 GND
5V (RELAY) 2 12V (RELAY)
5V (LOGIC) 3 5V (LOGIC)
POWER SUPPLIES
DIO1 4 DIO2
DIO3 5 DIO4
EOI 6 DAV
NRFD 7 NDAC
IFC 8 SRQ
ATN 9 Reserved
DIO5 10 DIO6 (MISO)
DIO7 (MOSI) 11 DIO8 (SCK)
REN 12 Not Connected
Settled 13 Reserved (-SS)
Reserved 14 Not Connected
SYSTEM DIGITAL BUS
(Parallel and Serial Bus)
ANALOG 1.1 15 ANALOG 1.1
ANALOG 1.2 16 ANALOG 1.2
ANALOG 1.3 17 ANALOG 1.3
ANALOG 1.4 18 ANALOG 1.4
ANALOG 1.5 19 ANALOG 1.5
ANALOG 1.6 20 ANALOG 1.6
ANALOG 1.7 21 ANALOG 1.7
ANALOG 1.8 22 ANALOG 1.8
ANALOG 1.9 23 ANALOG 1.9
ANALOG 1.10 24 ANALOG 1.10
ANALOG BUS
SLOT ADDRESS BIT 0 25 SLOT ADDRESS BIT 1
SLOT ADDRESS BIT 2 26 SLOT ADDRESS BIT 3
BACKPLANE ADDRESS BIT 4 27 BACKPLANE ADDRESS BIT 0
BACKPLANE ADDRESS BIT 1 28 BACKPLANE ADDRESS BIT 2
POSITION LOCATOR
Not Connected 29 Not Connected
12V (RELAY) 30 12V (RELAY)
5V (LOGIC) 31 5V (LOGIC)
GND 32 GND
POWER SUPPLIES

NOTE:
The analog bus is not used.

Figure 2.2 - System 10 Backplane Connector: Pin Outs

SECTION 3 - PROGRAMMING

SELECT MODULE ADDRESS

The module internal address is factory pre-set, please refer to case schematic diagram supplied with the System 10/20 case. To change the internal address please refer to Section 4, Reconfiguring Modules to Your Application.

PROGRAMMING USING THE INTELLIGENT GPIB/RS-232 INTERFACE

The R.F. Module is simple to program either by single relay or by pattern (4 relays simultaneously)

ARESET a Open all switches on module a
CLOSE a,b Close switch number b on module a
DELAY t Force a minimum delay of t milliseconds between two instructions
OPEN a,b Open switch number b on module a
RESET Open all switches on all modules
VIEW? a[,b] View status of module a, can be viewed at any time either as a byte orby switch as a logical value (1 or 0)
WRITE a,w Send byte w to module a

For more details on programming see the programming manual for the IEEE-488.2/RS-232 interface module.

Example

To switch relay 1 of the module in addr 5, type cl 5,1 and press return. LED 1 should illuminate on the module in addr 5

To switch relay 2 of the module in addr 5, type cl 5,2 and press return. LED 2 should illuminate on the module in addr 5

To switch relay 3 of the module in addr 5, type cl 5,3 and press return. LED 3 should illuminate on the module in addr 5

To switch relay 4 of the module in addr 5, type cl 5,4 and press return. LED 4 should illuminate on the module in addr 5

Type VI? to confirm the settings.

OPERATING SPEED

Module operating speed, i.e. the time taken to open or close a channel, is approximately 10ms using the 10-921 IEEE-488.2/ RS-232 interface module.

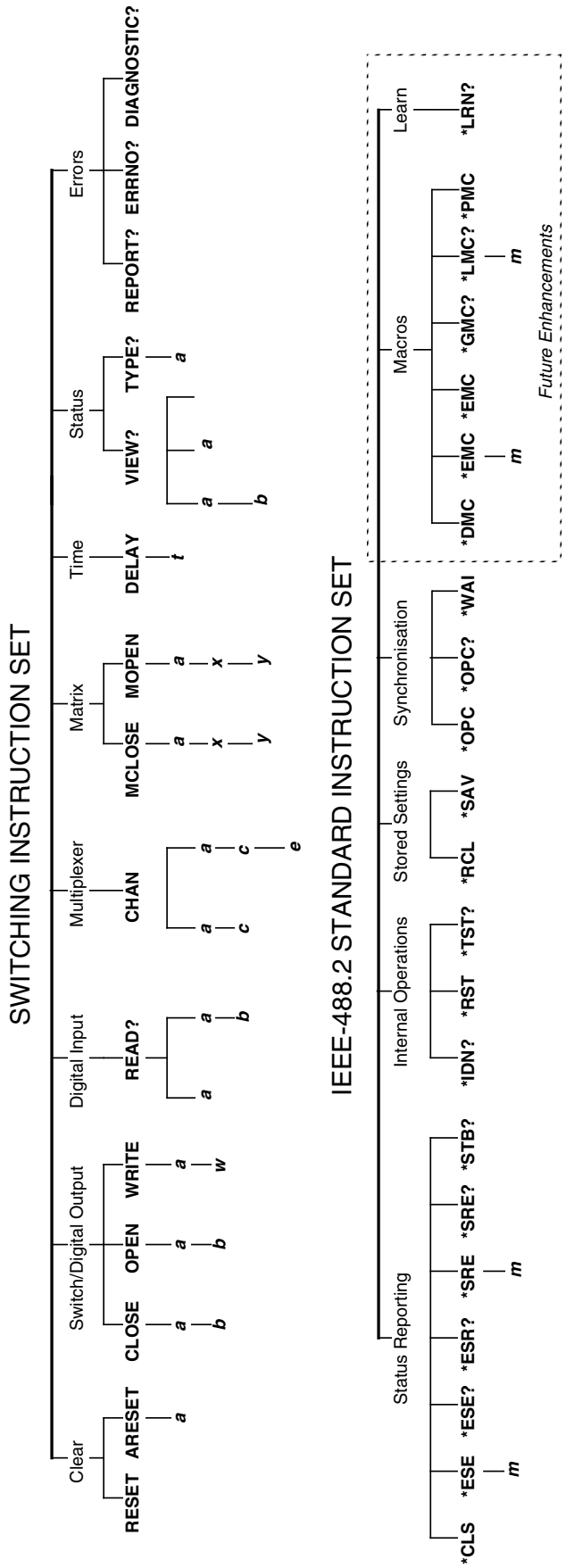


Figure 3.1 - Interface Module Instruction Set

SECTION 4 - RECONFIGURING MODULES

MODULE CONFIGURATION

Modules are configured using the internal RS232 Serial port connected via the 4 pin Datamate connector on the front panel with the supplied lead. Configuration data is stored within the module in EEPROM and may be altered using a dedicated terminal or a computer terminal program, set up as follows:

Baud rate 9600
8 Data bits
1 Stop bit
No parity.

There are three groups of commands available via the internal RS232 interface which are used to operate and configure the module. The groups are;

1. User Instruction Set: Commands to operate switches, provide relay status and module information.
2. Configuration Instruction Set: Commands to set up the module to a specific configuration.
3. Factory Instruction Set: Commands to set the module self test limits.

All instructions must be entered as shown for the command to operate correctly.

The module is configured with the following factory settings

Software V2.01, 23-04-98 (c) Pickering Interfaces 1997
cf
Configured as 4 x RF Changeover Relays
CF 1 5 Address 19
CF 2 0 MUX Banks CF 3 0 Pod
CF 4 0 Switch mode CF 5 0 Ruthenium Switch
CF 6 0 Panel Width CF 7 86 Self test
CF 8 4 Module data 1, Bits Out
CF 9 0 Module data 2, Bits Out Start
CF 10 0 Module data 3, Bits In
CF 11 0 Module data 4, Not used
CF 12 0 Configuration Mode
zl
ZL 1 30 Min coil 200R ZL 2 144 Max coil 5900R
ZL 3 69 Contact On 1380mR ZL 4 48 Contact Change 960mR
ZL 5 128 Contact Off
ZL 6 136 Service Temp. 54 C ZL 7 168 Fail Temp. 66 C
ZL 8 244 Min Logic 4.7V
ZL 9 100 Min LED 1.9V ZL 10 180 Max LED 3.5V
ZL 11 128 Min Panel LED 2.5V ZL 12 176 Max Panel LED 3.4V
ZL 13 180 Min Relay 9.0V (10.9V) ZL 14 254 Max Relay 12.7V
ZL 15 10 Fail Retry
ZL 16 25 Settle Delay 250us

USER INSTRUCTION SET

Command	Ascii	Bytes	Description	Example
Relay Block	BL	8 bytes of data	64 bit block of relay data.	
Block View?	BV		View status of all relays.	
Diagnostic?	DI		Report self test errors.	
Dump	DU	0	Relay test history dump.	DU 0
		1	Dump even if data is invalid.	DU 1
Close	CL	relay	Close a relay contact.	CL 7.
Close	CL	bank,channel	Close a MUX channel.	CL 1 4.
Close	CL	x axis, y axis	Close a matrix crosspoint.	CL 7 3.
Open	OP	relay	Open a relay contact.	OP 7.
Open	OP	bank,channel	Open a MUX channel.	OP 1 4.
Open	OP	x axis, y axis	Open a matrix crosspoint.	OP 7 3.
Reset	RS		Reset all relays to off.	
Service?		SR	Report all service warnings.	
Test	TS	0	Return result of last self test.	TS 0
		1	Initiate self test and return result.	TS 1
Type?	TY		Returns module type data string.	
Who?	WH		Module introduction string.	
MUX Clear	XC	bank	Reset an individual mux bank.	XC 01.

CONFIGURATION INSTRUCTION SET

The Configuration instruction allows a module to be set up for a specific application by setting up its address, bank and self test options etc.. To view the current configuration settings without altering any parameters simply type "CF".

Config Command

Ascii	Bytes	Description	Example
CF	1 x	x = Module address.	CF 1 5
CF	2 x	x = Number of multiplexer banks in module.	CF 2 4
CF	3 x	x = Number of pods in module.	CF 3 0
CF	4	Switch Mode	
	0	For I/O Modules mode is always 0.	CF 4 0
	0 or 1	MUX modules, 0 = normal, 1 = multi channel	CF 4
	0 or 1	Matrix modules, 0 = RF, 0 or 1 for others.	CF 5
Switch Type.			
	0	Ruthenium.	CF 5 0
	1	Mercury.	CF 5 1
CF	6	Panel Width. For future use.	
CF	7	Selftest Options	
		Each bit enables a specific test.	
		Bit 0 = Spare. LSB.	
		Bit 1 = RAM test.	
		Bit 2 = Panel LED test.	
		Bit 3 = Coil test.	
		Bit 4 = LED test.	
		Bit 5 = Switch Contact test.	
		Bit 6 = Temperature test.	
		Bit 7 = Selftest at start up. MSB	
CF	8	Module data 1	

CF	9	Module data 2
CF	10	Module data 3
CF	11	Module data 4
CF	12	Configuration mode

Module data is dependent upon Module type as follows;

Module data byte	I/O Module	MUX Module	Matrix Module
1	Bits Out	Size	X Size
2	Bits out start	Start	Y Size
3	Bits in	Not used	X Start
4	Not used	Not used	Y Start

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SECTION 5 - SPECIFICATION

GENERAL SPECIFICATION (ALL VERSIONS)

Maximum Voltage	50V d.c.
Maximum Power	10W
Maximum Carry Power (900MHz)	15W
Maximum Switch Current	0.1A
On Path Resistance	< 200 mOhm
Off Path Resistance	> 10^8Ohm
Differential Thermal Offset	< 20µV
Expected Life (Low Power)	> $2x10^7$ ops
Expected Life (Max Power)	> $3x10^5$ ops
Switching Time	10ms

ISOLATION AND CROSSTALK SPECIFICATION

Isolation (0 to 3000MHz)	> 40dB
Crosstalk (0 to 3000MHz)	> 60dB

10-710AA 50OHM SPECIFICATION (SMA & TYPE N)

Maximum Frequency	3000MHz
Rise Time	< 0.2ns
Insertion Loss	< 3dB
V.S.W.R. (0 to 2000MHz)	< 1:1.7

10-710AA 50OHM SPECIFICATION (BNC)

Maximum Frequency	1000MHz
Rise Time	< 0.2ns
Insertion Loss < 3dB	
V.S.W.R. (0 to 1000MHz)	< 1:1.7

10-710AA 75OHM SPECIFICATION (BNC)

Maximum Frequency	1000MHz
Rise Time	< 0.3ns
Insertion Loss	< 3dB
V.S.W.R. (0 to 1000MHz)	< 1:1.7

WIDTH AND DIMENSIONS

All modules conform to the 3U height (128mm) Eurocard standard and are 160mm deep. Panel width is 60mm.

POWER SUPPLY SPECIFICATION

5V d.c.	< 0.5A
12V d.c.	< 0.7A
Total Power	< 11W
Power Up Delay	< 5s (required for self-test)

ENVIRONMENTAL SPECIFICATION

Operating Temperature	0 to 45ºC
Storage Temperature	-20 to +75ºC
Humidity	95% Non Condensing
Cooling Requirements	Forced ventilation advised